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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/602,147	06/24/2003	Chih-Hsiang Yao	TSM02-1098	9881

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EXAMINER	
STEVENSON, ANDRE C	
ART UNIT	**PAPER NUMBER**
2812	

DATE MAILED: 04/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/602,147	YAO ET AL.	
	Examiner	Art Unit	
	Andre' C. Stevenson	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

1)☒ Responsive to communication(s) filed on *January 19, 2004* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *17-19* is/are allowed.

6)☒ Claim(s) *1,2,4-8,13 and 15* is/are rejected.

7)☒ Claim(s) *3,9-12,14 and 16* is/are objected to.

8)☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a)☒ All b)☐ Some * c)☐ None of the CERTIFIED copies of the priority documents have been:

1.☒ received.

2.☐ received in Application No. (Series Code / Serial Number) _____ .

3.☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

15)☒ Notice of References Cited (PTO-892)
16)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
17)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
18)☐ Interview Summary (PTO-413) Paper No(s). _____ .
19)☐ Notice of Informal Patent Application (PTO-152)
20)☐ Other:

Detail Action

Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 10602147, filed on June 24, 2003.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims rejected under 35 U.S.C. 103(a) as being unpatentable over Doong et al (U.S. Pat. No.6577149), and further in view of Ivanov et al (U.S. Pat. No.6194739 B1).

Doong et al (U.S. Pat. No.6577149), for **Claim #1**, a test pattern comprising: a first metal structure disposed over a substrate; one or more intermediate layers disposed above the first metal structure; a second metal structure disposed above the one or more intermediate layers, wherein at least a portion of the second metal structure is above the first metal structure and the second metal structure is smaller than the first metal structure **(Fig. 6 a-c, items 480, 487, 478, 476, 482 and 484, Column 5, lines 24 through 47)**; a first via passing through the intermediate layers and connecting the first metal structure to the second metal structure; one or more third metal structures disposed above the one or more intermediate layers and the first metal

structure, and separated from the second metal structure by a dielectric material; and one or more second vias passing through the intermediate layers and connecting the first metal structure to the third metal structures, each second via located a predetermined radius from the center of the first via.

Doong et al (U.S. Pat. No.6577149) discloses the claimed invention except for first via passing through the intermediate layers and connecting the first metal structure to the second metal structure; one or more third metal structures disposed above the one or more intermediate layers and the first metal structure, and separated from the second metal structure by a dielectric material; and one or more second vias passing through the intermediate layers and connecting the first metal structure to the third metal structures, each second via located a predetermined radius from the center of the first via. Ivanov et al (U.S. Pat. No.6194739 B1) teaches that it is known to have a first via passing through the intermediate layers and connecting the first metal structure to the second metal structure; one or more third metal structures disposed above the one or more intermediate layers and the first metal structure, and separated from the second metal structure by a dielectric material; and one or more second vias passing through the intermediate layers and connecting the first metal structure to the third metal structures, each second via located a predetermined radius from the center of the first via.

Considering now, **Claim #1**, a passing through the intermediate layers and connecting the first metal structure to the second metal structure; one or more third

metal structures disposed above the one or more intermediate layers and the first metal structure, and separated from the second metal structure by a dielectric material; and one or more second vias passing through the intermediate layers and connecting the first metal structure to the third metal structures, each second via located a predetermined radius from the center of the first via, is taught by Ivanov et al (U.S. Pat. No.6194739 B1) (Column 8, lines 55 through 67, Column 9, lines 1 through 18).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have passing through the intermediate layers and connecting the first metal structure to the second metal structure; one or more third metal structures disposed above the one or more intermediate layers and the first metal structure, and separated from the second metal structure by a dielectric material; and one or more second vias passing through the intermediate layers and connecting the first metal structure to the third metal structures, each second via located a predetermined radius from the center of the first via as taught by Ivanov et al (U.S. Pat. No.6194739 B1), since Ivanov et al (U.S. Pat. No.6194739 B1) states at Column 8, lines 55 through 67, Column 9, lines 1 through 18 that such a modification would allow reduction of errors that must be corrected for and thus improves the accuracy of the measurements.

With respect to **Claim #2**, a test pattern as recited in claim 1, wherein the radius is selected to measure an effective vacancy diffusion area, is linear, is taught by Ivanov et al (U.S. Pat. No.6194739 B1) (Column 8, lines 55 through 67, Column 9, lines 1 through 18).

Considering now, **Claim #4**, a test pattern as recited in claim 1, wherein the first via is approximately centered over the first metal structure, is taught by Ivanov et al (U.S. Pat. No.6194739 B1) (Column 8, lines 55 through 67, Column 9, lines 1 through 18).

With respect to **Claim #5**, a test pattern as recited in claim 1, wherein each second via is connected to a separate third metal structure, is taught by Ivanov et al (U.S. Pat. No.6194739 B1) (Column 8, lines 55 through 67, Column 9, lines 1 through 18).

Furthermore, **Claim #6**, a test pattern as recited in claim 1, wherein all of the second vias are connected to a single third metal structure, is taught by Ivanov et al (U.S. Pat. No.6194739 B1) (Column 8, lines 55 through 67, Column 9, lines 1 through 18).

With respect to **Claim #7**, a test pattern as recited in claim 1, wherein the intermediate layers substantially comprise a dielectric material, is taught by Ivanov et al (U.S. Pat. No.6194739 B1) (Column 8, lines 55 through 67, Column 9, lines 1 through 18).

Considering now, **Claim #8**, a test pattern as recited in claim 7, wherein the dielectric material is a low-k dielectric material, is taught by Ivanov et al (U.S. Pat. No.6194739 B1) (Column 8, lines 55 through 67, Column 9, lines 1 through 18).

With respect to **Claim #13**, a test pattern as recited in claim 1, wherein the first metal structure has an area selected from a range of about 100 pm2 to about 500 pm2, is taught by Ivanov et al (U.S. Pat. No.6194739 B1) (Column 5, lines 35 through 52).

With respect to **Claim #15**, a test pattern as recited in claim 1, wherein the second metal structure and the one or more third metal structures are separated by a multiple of about 0.5 pm, is taught by Ivanov et al (U.S. Pat. No.6194739 B1) (Column 5, lines 35 through 52).

Objected Claims

Claim #3

- ✓ One or more fourth vias passing through the intermediate layers and connecting the fourth metal structure to the fifth metal structures, each fourth via located outside of a predetermined radius from the center of the third via.

Claim #9

- ✓ Material is chosen from the group consisting of polymide, silicon oxycarbide, hydrogen silsesquioxane, methyl silsesquioxane, bezocyclobutene, fluonnat6d glass, fluorinated aromatic ether, and inter penetrated spin-on glass.

Claim #10

- ✓ Third metal structure comprise copper.

Claim #11

- ✓ Second vias comprise copper.

Claim #12

- ✓ Radius is within a range of about 0.5 pm to about 10 pm.

Claim #13

- ✓ A range of about 100 pm2 to about 500 pm2.

Claim #14

- ✓ Planar dimensions are about 20 pm by a multiple of about 3pm.

Claim #16

- ✓ Planar dimensions are 20 μm by a multiple of 3μm; the second metal structure planar dimensions are at least 0.11 μm by 10 μm; the third metal structure planar dimensions are at least 0.3 μm by 0.3 μm; the second metal structure and the one or more third metal structures are separated by a multiple of 0.5 μm; and the first via and second vias have a width of at least 0.1 μm.

Allowable Subject Matter

The following is an examiner's statement of reasons for allowance: The prior art fails to teach one or more second vias passing through the intermediate layers and respectively connecting the first metal structure to the third metal structures, each second via located outside of a predetermined radius from a center of the first via, which predetermined radius is different for each test substructure.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Claims 17 through 19 are allowed.

Claims #17

- One or more second vias passing through the intermediate layers and respectively connecting the first metal structure to the third metal structures, each second via located outside of a predetermined radius from a center of the first via, which predetermined radius is different for each test substructure.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866 – 217 – 9197 (toll-free).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andre' Stevenson whose telephone number is (571) 272 1683. The examiner can normally be reached on Monday through Friday from 7:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling, can be reached on (272) 571 1683. The fax phone number for the organization where this application or proceeding is assigned is (703) 308 7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308 0956. Also, the proceeding numbers can be used to fax information through the Right Fax system;

(703) 872-9306

John F. Niebling
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04/14/04